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Department of Computer Science
LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE
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September 29, 1991

Defense Technical Information Center,
Building 5, Cameron Station,
Alexandria, Virginia 22304-6145.

Dear Sir,

Please find enclosed 2 copies of our annual report (1990-1991) on our Grant No. N00014-91-J-1306 titled "A General Theory of Signal Integration for Fault-Tolerant Dynamic Distributed Sensor Networks".

If you need more information please do not hesitate to contact me.

Sincerely yours,

S. S. Iyengar
Professor and Interim Dept. Chairman,
Principal Investigator.

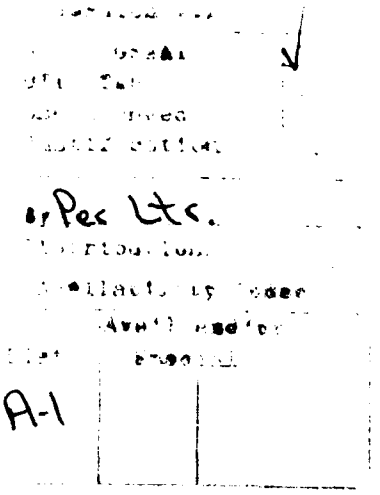
FIRST YEAR PROGRESS REPORT

Sept 20, 1991

GRANT NO : N00014-91-J-1306

TITLE OF THE PROJECT:

A General Theory of Signal Integration for Fault-Tolerant Dynamic Distributed Sensor Network



Statement of the problem:

In recent years, the increasing sophistication of surveillance systems and tracking mechanisms has generated a great deal of interest in the development of new computational structures and architectures for detecting and tracking multiple targets, using data from many sensors.

The design of spatially distributed target-detection-and-tracking systems involves the integration of solutions obtained by solving subproblems in data-association, hypothesis testing, data-fusion, etc. This must include the cooperative solution of problems by a decentralized and loosely coupled collection of processors, each of which integrates information received from a cluster of spatially distributed sensors into a manageable and reliable output for further integration at a higher level. This process requires the design of efficient architectures and computational techniques to abstractly represent and integrate sensor information.

The following issues were studied and worked upon this year:

1) Fault-tolerant computational model for sensor integration.
2) Functional characterization of sensor integration in distributed sensor networks.
3) Information routing and reliability issues in distributed sensor networks.
4) Information integration and clock synchronization issues in distributed sensor networks.
5) Design of fault-tolerant architectures for distributed sensor networks.

Attatched to this report is a list of publications resulting from this research.

RESEARCH PUBLICATIONS

List of papers submitted to refereed journals:

1. S. S. Iyengar, M. B. Sharma, and R. L. Kashyap "Information Routing and Reliability Issues in Distributed Sensor Networks," IEEE Trans. on ASSP.
2) Dev Kumar and S. S. Iyengar "Correctness proof of a Distributed Depth First Search Algorithm," ACM Trans. on Programming Languages and Systems.

List of papers accepted/published in refereed journals:

1) S. S. Iyengar, R. L. Kashyap, and R. N. Madan "A Computational Taxonomy on Distributed Sensor Networks," IEEE Trans. on SMC, Vol. 21, No. 5, Sept-Oct 1991.
2) S. S. Iyengar, D. N. Jayasimha, and R. L. Kashyap "Information Integration and Clock Synchronization in Distributed Sensor Networks," IEEE Trans. on SMC, Vol. 21, No. 5, Sept-Oct 1991.
3) S. Rajanarayan and S. S. Iyengar "A New Optimal Distributed Algorithm for Set Intersection Problem," Information Processing Letters, Vol. 38, May 1991, pp. 143-148.
4) S. S. Iyengar "Distributed Sensor Networks: A Computational Perspective," Journal of Computer Science and Informatics, Vol. 21, No. 1, 1991.
5) L. Prasad, S. S. Iyengar, R. L. Kashyap, and R. N. Madan "Functional Characterization of Sensor Integration in Distributed Sensor Networks," IEEE Trans. on SMC, Vol. 21, No. 5, Sept-Oct 1991. (also presented at the Parallel Processing Symposium in Los Angeles)

Papers in Progress:

1) B. Jones and S. S. Iyengar "Information - Theoretic Component of Distributed Sensor Networks," will be submitted to International Journal of Systems Theory.

2) S. S. Iyengar, D. N. Jayasimha, D. Nadig, and D. K. Pradhan "A Versatile Architecture for Distributed Sensor Integration Problem," Paper in preparation.

3) L. Prasad and S. S. Iyengar "A General Computational Framework for Distributed Sensing and Fault-Tolerant Sensor Integration," Paper in preparation.

Technical Report:

1) "Functional Characterization of Fault-Tolerant Integration in Distributed Sensor Networks". School of Electrical Engineering, TR-EE-91-23 Technical Report, Purdue University, West Lafayette, IN 47907.

PUBLICATIONS/PATENTS/PRESENTATIONS/HONORS REPORT
for
1 Oct 90 through 30 Oct 1991

R&T Number: 4148120---01

Contract/Grant Number: N 00014-91 J-1306

Contract/Grant Title: A General Theory of Signal Integration for Fault-Tolerant Dynamic Distributed Sensor Networks

Principal Investigator: S. S. Iyengar

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a. Number of Papers Submitted to Refereed Journal but not yet published: 2

b. Number of Papers Published in Refereed Journals: 5
(list attached)

c. Number of Books or Chapters Submitted but not yet Published: 1

d. Number of Books or Chapters Published: _____
(list attached)

e. Number of Printed Technical Reports & Non-Refereed Papers: 1
(list attached)

f. Number of Patents Filed: none

g. Number of Patents Granted: none
(list attached)

h. Number of Invited Presentations at Workshops or Prof. Society Meetings: _____

i. Number of Presentations at Workshops or Prof. Society Meetings: 1

j. Honors/Awards/Prizes for Contract/Grant Employees:
(list attached, this might include Scientific Soc Awards/Offices, Promotions, Faculty Awards/Offices etc)

k. Total number of Graduate Students and Post-Docs Supported at least 25% this year on this contract/grant:

Grad Students 2 and Post-Docs _____.

How many of each are females or minorities? (These 6 numbers are for ONR's EEO/Minority Reports; minorities include Blacks, Aleuts AmIndians, etc and those of Hispanic or Asian extraction/nationality. The Asians are singled out to facilitate meeting the varying report semantics re "under-represented").

Grad Student Female _____

Grad Student Minority _____

Grad Stu Asian e/n 2

Post-Doc Female _____

Post-Doc Minority _____

Post-Doc Asian e/n _____